programmed booklet



SESSION 8A DECIMAL ARITHMETIC III

Before starting the Programme write down the answers to the following in the spaces provided:

1.	Write down 25p using the £ sign.	lene Luic bot raminissumin
2.	Using the £ sign write down :	
	(a) Eight new pence	
	(b) One pound and one half new penny	30 (0. ts)
	(c) Eighty pence	
	(d) Two and a half new pence	
	(e) Thirty-two and a half pence	
3.	How would the sum of eleven pounds	
	thirty-three pence appear in the	£
	figures space on a cheque ?	
4.	Show the two acceptable methods of writing	ng the following:
4.	(a) Five and a half new pence	ig the following .
	(b) Twenty-one pence	or
	(b) Twenty-one pence	0.130 913
5.	Show the written expression for	
	two thousand, three-hundred and	AT ALX TO
	forty-eight pounds and seventy-four pence	
6.	Write down the following amounts in word	s:
	(a) 7½p	,
	(b) £65·10	
	(c) f42.85	

When you have completed the quiz check your answers on the next page.

ANSWERS.

- 1. £0.25
- 2. (a) £0.08
 - (b) £1.00½
 - (c) £0.80
 - (d) $£0.02\frac{1}{2}$
 - (e) $£0.32\frac{1}{2}$
- 3. £11—33
- 4. (a) $5\frac{1}{2}$ p or £0.05 $\frac{1}{2}$
 - (b) 21p or £0.21
- 5. £2,348·74
- 6. (a) Seven and a half new pence
 - (b) Sixty-five pounds, ten new pence
 - (c) Forty-two pounds, eighty-five pence

If you had more than three answers wrong refer to the Instructor before going on with the Programmed Text.

THIS PROGRAMME DEALS WITH ARITHMETIC.
DO NOT BE DISCOURAGED IF YOU ARE NOT FAMILIAR WITH DECIMALS. DECIMAL ARITHMETIC IS VERY SIMPLE, AS YOU WILL FIND WHEN YOU COME TO WORK THROUGH THE EXERCISES.

In the programme there are a number of blank spaces and questions. Whenever you come to a blank space or question write down the missing answer in pencil.

Each space is marked with a number in brackets; e.g. (14). Check your answers at the end of each stage as indicated in the text. If you get more than two answers wrong you should work through that stage again.

PART I — SIMPLE DECIMAL ARITHMETIC

As long as shillings and pence are in multiples of 6d (e.g. 6d, 1s, 1s 6d, 2s etc.) it is possible to convert them directly to new pence. We have seen that 1s = 5p and $6d = 2\frac{1}{2}p$. Therefore $1s 6d = \dots (10)$ and $3s 6d = \dots (11)$.

Conversion of amounts less than 6d cannot be achieved in round new pence or new halfpence. For example $3d = 1\frac{1}{4}p$, but there is no such coin as $\frac{1}{4}p$. This raises certain problems for the changeover period which we shall discuss a little later on.

Provided you understand that one new penny is worth just a little less than two pence halfpenny (in old currency) and the new halfpenny just a little more than the old penny, we can put aside the problem of conversions under 6d or $2\frac{1}{2}p$ for the moment and do a few arithmetic exercises in decimal currency.

ADDITION AND SUBTRACTION

Addition and subtraction in decimals are carried out in the normal way, though it is necessary to keep the decimal points and the figures exactly in line. Study the simple examples below:

Addition

Whole numbers	Decimals
2356	23.56
1038	10.38
472	4.72
3866	38.66

Both sets of figures are added in the usual way. Notice how a vertical line could be drawn through the decimal points in the example with decimals.

Subtraction

Whole numbers	Decimals
4762	47.62
2339	23.39
2423	24.23

Note again the alignment of the decimal points.

Now attempt the following additions and subtractions: (12)

Addition

Subtraction

The calculations above were set out for you. Now set out and add the following:- (13)

Next, set out and subtract:- (14)

- (a) £93.72 from £102.59
- (b) £69.54½ from £86.61

In your head subtract:- (15)

£97.50 from £162.50

DIVISION

Division in decimals presents no special problem as long as you remember to place the decimal point in your answer in line with that which appears in the sum to be divided. For example, in whole numbers 3648 divided by 12 is set out:—

12)3648 and £36·48÷12 is set out 12)£36·48
$$= \frac{304}{304}$$
 $= \frac{12}{304}$ $= \frac{12}{304}$ Also 6408÷8 appears as:—

8)6408 and £64·08÷8 is set out 8)£64·08 $= \frac{12}{304}$ $= \frac{12}{304}$

Try the following (16):—

- (a) £5500 divided by 5
- (b) £5.50 divided by 5
- (c) £55.00 divided by 5

and this one (17):—

- (a) £3641 divided by 11
- (b) £36.41 divided by 11
- (c) £364·10 divided by 11

MULTIPLICATION

When multiplying pounds and new pence or new pence alone, the simple rule to follow is to multiply in the ordinary way ignoring the decimal point, but treat the last two whole figures of your answer as new pennies and then insert the decimal point.

Thus treat $10 \times £27.39$ as 10×2739 for purposes of the multiplication. The answer (product) is 27390. The last two whole figures are new pence, so insert the decimal point to give £273.90. Study examples (a) and (b) below and then complete example (c). (18)

		(a)	(b)	(c)
problem:		20 x £1·21	15 x £0·23 (or 23p)	12×£3·12
·treatas:		20 x 121	15×23	
		=2420	=345	
insert point be	fore last two w	hole figures:		
		=£24.20	=£3.45	

The rule still applies if new halfpennies are included in the multiplication.

Treat the last two whole figures as new pence and insert the point accordingly =£1.43 $\frac{1}{2}$.

When multiplying by numbers above 10 it is easier to treat any $\frac{1}{2}p$ as £0-005. Thus £5-06 $\frac{1}{2}$ becomes £5-065. Ignore the point and multiply in the usual way, but in your answer, if the last figure is 5 convert it to $\frac{1}{2}$, or if it is 0, delete it. Treat the last two figures as new pence and insert the decimal point. Now study (a) below and complete (b) and (c). (20)

	(a)	(b)	(c)	
problem:	31 x £5⋅06½	14×£16·24½	23×£8·15½	
treat as:	31 × 5.065	14× 16·245	23 x 8·155	
ignore point	5065 × 31	16245 × 14	8155 × 23	
	5065 151950	64980	24465	
	157015	227430	187565	
convert last figure, if 5, to ½, delete if it is 0	15701½	22743Ø	(i)	
insert point before last two whole figures.	£157·01½	£	(ii)	

END OF PARTI

PARTI-ANSWERS

Page 4

- (1) 100p (or one hundred pence)
- 50p (fifty pence)
- (3) 2s (two shillings)
- (4) 10p (or ten new pence)
- (6) 5p

- sixpence
- 2½p
- 2½p
- 7½p

Page 5

- - 12.76

- 285.54=
- 165.871

- (13)
- 0.04 28.42 =
- 438.
- £466·46½
- 102.59 93.72

- 86.61 69.541
 - £17.06½

- (15)
- £65

- Page 6 (16) (a) 5)5500 £1100
 - (b) 5)5.50

£1.10

5)55.00 £11·00

- (17) (a) 11)3641

 - (b) 11)36·41 £3.31
 - 11)364.10 £33·10

- Page 7 (18) (c) $=12 \times 312$ =3744
 - (insert point) =£37.44
- new pence

- Page 8 (20) (b) £227.43
 - (c) (i) $18756\frac{1}{2}$
 - (ii) £187.56½

PART II -- PERCENTAGES

Even if you do not have to use percentages in your job you will find it useful to work through this part of the programme since it will improve your understanding of the function of a decimal point. Once you have grasped this and you are able to multiply and divide by ten or a hundred without difficulty you will find that it is much easier to deal with £ and p in new money.

When you first learned arithmetic you may have learnt to put figures into columns marked "HTU" meaning "hundreds, tens and units", or "THTO" meaning "thousands, hundreds, tens and units". Thus, one hundred and fifty four:

When this is multiplied by ten the figures remain the same but they are moved to the left and a nought is put into the space which is empty:

To divide 1540 by 10 the figures are moved one place to the right:

If we were heading the columns "HTU" the decimal point would appear on the right of the "U" column:

So that 154 divided by 10 becomes:

If you are already familiar with working in decimals you may think of this as moving the decimal point to the left instead of moving the figures to the right. This amounts to the same thing but it may be simpler to think of the decimal point staying where it is and moving the figures across it. Now we have arrived at one tenth of 154. How do we divide 15.4 by ten? So one tenth of 15.4 is 1.54 You can check this very easily from what you already know about the new money. What would be the cost of ten articles at £1.54 each? To divide by 100 we divide by 10 and then by 10 again: 154 ÷ 10 =15.4= 1.5415.4 - 10

 $154 \div 100$

= 1.54

So:

"Per cent" means "per hundred" and can be written "%"
To arrive at one per cent (1%): we divide by 100, putting in a decimal point if necessary 1% of 500 is 5.00
What is 1% of 300?(6)
What is 1% of 250?(7)
If one per cent is one in a hundred ten per cent is ten times as much, i.e. ten in every hundred
Ten in every hundred is the same as one in every(8)
So, to calculate 10% of anything we divide by 10.
We have seen that one per cent of 500 is 5
What is ten per cent of 500?(9)
You can already divide by ten using decimals.
What is 10% of 154?(10)
Now, an example with money:
What is 10% of £3·50?(11)
That came to a round number of pence but it will not always be so.
What is 10% of £3·45?(12)
What has happened here? To divide by ten we moved the figures across the decimal point to the right. This has given us three figures after the decimal point. So we have five tenths of 1p. It there are ten buttons and five of them are black, the other five being white, what proportion of the ten are black?
(put x against the correct answer) (13) One third One half One quarter
So, what is 흉 of 1p?(13)
Then what is £0·345 expressed in pence?(14)

Now we shall see what happens if the third figure after the decimal point is not a 5.

The method is the same:

10% of £3.44

is £0.344

There are p coins but not a coins so we take it to the nearest half

It is clear that 4 is nearer to 5 than it is to 0 so if we are dealing with half pence

£0.344 becomes 34½p

£0.343 also becomes 34½p

hut £0.342 becomes 34p

(because 342 is nearer to 340 than it is to 345)

Sometimes you will not be using half pence.

If you are working to whole pence the rounding off rule changes slightly.

If the third decimal figure is 5 or more go to the next number above:—

£0.655 becomes £0.66

£0.656 becomes £0.66

	마이트 - HEREN HE	하는 보다 보고 있는데 보고 있는데 이 바이를 하는데 하는데 되고 있다고 있다면 되었다. 그런데 이 사람들은 이 바이를 하는데 보고 있다고 있는데 되는데 되었다면 하는데 보고 있는데 되었다. 그런데 	
	£0.657 becomes	(17)
	£0.658 becomes)
	£0.659 becomes	(19)
If the third figure is less than	5 go to the next numb	er below:	
	£0.654 becomes f	20.65	
	£0.653 becomes f	20.65	
	£0.652 becomes)
	£0.651 becomes	(21	
Try some more examples (ro	unding off to whole pe	ence)	
	£0.674	(22)
	£1.725)
	£3.923	(24	
Now that we can calculate to 5 is half of 10 so 5% is half of		calculate five per cent.	
What is 10% of £1.60?		(25)	
What is half of 16p?		(26)	
So what is 5% of £1.60?			
Try some more examples:			
5% of £56.00		(28)	
5% of £10·20		(29)	

In the examples which follow, round off to the nearest ½p.

It is important to remember that you must not round off first and then divide by two. You must divide before rounding off.

In the examples which follow show 10% and 5% with three figures after the decimal point in the column headed "Exact" and rounded off to the nearest ½p in the column headed "Approx". (30)

AMOUNT	10	%	5	%
	EXACT	APPROX.	EXACT	APPROX.
£ 4.50				
£ 2.66				
£29.32				
£66.44				

To calculate $2\frac{1}{2}\%$ the principle is the same $2\frac{1}{2}$ is a quarter of 10 So $2\frac{1}{2}\%$ is a quarter of 10%. What is 10% of £3·60? (31) What is $\frac{1}{2}$ of 36? (32) So what is $2\frac{1}{2}\%$ of £3.60? (33) Try some more examples without rounding off: £2·66—10% is (34) $2\frac{1}{2}\%$ is (37) £29·32—10% is (35) $2\frac{1}{2}\%$ is (38) £4·50—10% is (36) $2\frac{1}{2}\%$ is (39)

Now try some percentages, rounding off to the nearest whole penny:

10% of £12.60	(40)
10% of £12.65	(41)
5% of £32.20	(42)
5% of £32.17	(43)
2½% of £64.40	(44)
2½% of £64.34	(45)

10%, 5% and 2½% are quite easy to do in your head but with more complicated amounts (e.g. 3¾% or 12½%) you will normally find it easier to use a ready reckoner.

Here is part of a ready reckoner:—

£	10%	12½%	15%
52.00	5.20	6.50	7.80
52.05	5.21	6.51	7.81
52.10	5.21	6.51	7.82
52.15	5.22	6.52	7.82
52.20	5.22	6.53	7.83
52.25	5.23	6.53	7.84
52.30	5.23	6.54	7.85
52.35	5.24	6.54	7.85
52.40	5.24	6.55	7.86
52.45	5.25	6.56	7.87
52.50	5.25	6.56	7.88

Using the table write down:—

15% of £52·35	(46)	
12½% of £52·15	(47)	
12½% of £52.50	(48)	
12½% of £52·25	(49)	
10% of £52.00	(50)	

You could use a table like this to calculate 10% but now that you know how easy it is to do it in your head it would take longer to find the right page in the ready-reckoner than it would to work it out.

PART II — ANSWERS

- Page 12 (1) Right
 - (2) 15.4
 - (3) Right

- (4) £15.40
- (5) £1.54

- Page 13 (6) 3.00
 - (7) 2.50
 - (8) Ten
 - (9) 50

- (10) 15.4
- (11) £0.35 (or 35p)
- (12) £0.345
- (13) one half
- (14) $34\frac{1}{2}p$

- Page 14 (15) 34p
 - $(16) 34\frac{1}{2}p$
- Page 15 (17) £0.66 (66p)
 - (18) £0.66 (66p)
 - (19) £0.66 (66p)
 - (20) £0.65 (65p)
 - (21) £0.65 (65p)
 - (22) £0.67 (67p)
 - (23) £1.73

- (24) £3.92
- (25) £0.16 (16p)
- (26) 8p
- (27) 8p (£0.08)
- . (28) £2.80
 - (29) £0.51

AMOUNT	1	0%	5%					
£	EXACT	APROX.	EXACT	APROX.				
4.50	0.450	0.45	0.225	0.221				
2.66	0.266	0.263	0.133	0.13½				
29.32	2.932	2.93	1.466	1.461				
66.44	6.644	6.641	3.322	3.32				

- (31) £0.36 (36p)
- (32) 9
- (33) £0.09 (9p)
- (34) £0.266
- (35) £2.932
- (36) £0.450
- (37) £0.0665 (7p)

- (39) £0·1125 (11p)
- (40) £1.26
- (41) £1.27
- (42) £1.61
- (43) £1.61
- (44) £1.61
- (45) £1.61
- (38) £0.733 (73p)
- Page 17 (46) £7.85
 - (47) £6.52
 - (48) £6.56

- (49) £6.53
- (50) £5.20

Part III - CONVERSIONS

Now that you are able to divide by 100 using decimals you will be able to understand *exact* conversions from £ s d to £p even where (for amounts below 6d) there are no coins to represent the exact amount.

There are twelve (old) pence in a shilling and twenty shillings in a pound.

Approximate conversions: the new halfpenny table

In converting their prices from £ s d to decimal, retailers and manufacturers are recommended to use the conversion table printed on one side of the separate sheet. Examine this table and you will see that where there is no exact conversion an approximate conversion appears. Thus 2d is treated as being worth 1p (even though as you have already seen, strictly, $1p=2\cdot4d$) and the nearest conversion for 3d is also 1p. In this "new halfpenny" table some of the conversions are rounded upwards and some downwards, with the effect that if the table is applied consistently to a large number of varied amounts there is no overall gain for either buyer or seller.

Using the new halfpenny conversion table, inside back cover, state conversions in decimal currency for 2s 11d (7), 11s 2d (8), 16s 7d (9).

The conversion table may be used by traders who mark prices in both currencies and it may also be used extensively for conversion of certain balances (for stores, etc.). Using the conversion table provided enter the missing figures in the following stock list and total the final column.

		Unit	Cost		
Description	Quantity	£ s d	Decimal Conversion		Stock Value
Shirts	5 @	22s	£1·10		£5.50
Vests	4 @	10s 4d	(10)		(11)
Blouses	3 @	28s 6d	(12)		
Shorts	6 @	19s 11d	(14)		(15)
			T	otal	(16)

Approximate conversions: the whole new penny table

Turn to the whole penny table, on the inside back page, and study this table. It is to be used for the conversion from D Day of bank balances and, for example, of references to shillings and pence on cheques. Thus a bank balance of £288 13s 7d converts to £288·68 from D Day, and a cheque for 19s 2d converts to £0·96 when paid in after D Day.

Other business organisations may also use this table for conversion of account balances and amounts due by weekly or monthly instalments.

N.B. It is very important to realise that although these tables may be used for converting prices once and for all or for converting balances outstanding they cannot be used for converting money because they are not exact. Once prices have been converted the amount due is in £p. It can be paid in £ s d only if an exactly convertible amount (i.e. a multiple of sixpence) is offered. e.g. 4p is not equal to 9d, nor is it equal to 10d. It is exactly equal to 9·6d so, to judge the price of an article priced at 4p the shopper could say "it is somewhere between 9d and 10d." If the shopper offered 9d it would not be enough. If 10d was offered it would be too much. If one shilling (equal to 5p) were offered exact change could be given.

PART III - ANSWERS

Page 19

- (1) 240
- (2) 2.40
- (3) 2·40 or 2·4
- $(4) \cdot 4.8$
- (5) 12
- (6) 1/-
- (/) $14\frac{1}{2}$
- (8) 56p
- (9) 83p

Page 20

- $(10) \quad £0.51\frac{1}{2}$
- (12) £1.42½
- $(14) \quad £0.99\frac{1}{2}$

- (11) £2.06
- $(13) \quad £4.27\frac{1}{2}$
- (15) £5.97
- (16) £17.80½

0012

(1) Complete the following:

(2) What change would you receive (or give) in a shop operating in decimal currency in the following instances:

Price	£off	s	d	Change in Decimal Currency
	£	S	d	
47p	1	0	0	(a)
£3.24½	3	6	0	(b)
3½p		1	0	(c)

- (3) (a) Convert (mentally) the following to decimal currency:
 - (i) £1 7s 6d
 - (ii) 18s 6d
 - (iii) 3s.
 - (b) Using the new halfpenny conversion table convert the following:
 - (i) 13s 11d
 - (ii) 4s 5d
 - (iii) 10d
- (4) For what purposes can the new halfpenny conversion table be used?

(5) Convert the following invoice to decimal currency: SANISALES LTD., CHAMBER LANE, W.C.1. To Marble Halls Ltd., Draner Way, Bath.

	£	S	d
6 chromium showers @£47s6d	26	5	0
Less 10% discount	2	12	6
	23	12	6

(6) Re-write the following restaurant bill and cheque in decimal currency, using the new halfpenny conversion table where there is no exact conversion.

	£s	d	
2 oxtail soups @ 3s	6	0	
2 portions roast beef @ 8s 6d	17	0	
2 vegetables @ 3s 6d	7	0	
1 ginger sponge @ 2s 3d	2	3	
1 apple tart @ 2s 9d	2	9	
2 coffees @ 1s 6d	3	0	
	£1 18	0	
10% service charge	3	10	
	£2 1	10	

WILD THYME BANK LTD. (Date)
ROSEDALE

Pay The Sweetpea Restaurant

£2 1 10

Two pounds, one shilling and tenpence

Flora Bunda

ANSWERS TO QUIZ

(1)	(a)	$\boldsymbol{\epsilon}$
		24.131
		0.01
		+342.46
		£366.60½

(5)	(summarise	d)
	6 @ £4·37½	=£26.25
	Less 10%	2.62 ½
		£23.62½

(6) (summarised)

£p

2 @ 15p = 30

2 @
$$42\frac{1}{2}p = 85$$

2 @ $17\frac{1}{2}p = 35$

1 @ $11p = 11$

1 @ $14p = 14$

2 @ $7\frac{1}{2}p = 15$

£1.90

10%

19

- (2) (a) 53p (b) $5\frac{1}{2}p$
 - (c) $1\frac{1}{2}p$
- (3) (a) (i) £1.37 $\frac{1}{2}$ (ii) £0.92 $\frac{1}{2}$ (or 92 $\frac{1}{2}$ p) (iii) £0.15 (or 15p)
 - (b) (i) 69½p
 (ii) 22p
 (iii) 4p
- (4) It provides a quick means of converting £ s d to decimal currency even where the figures can be converted exactly mentally (e.g. 15s = 75p) but it is also a means of converting to the nearest decimal halfpenny amounts less than 6d, and may be used for conversion of price lists or tariffs.

On the cheque the figures, if written, become £2-09 (note the hyphen, though if typed or printed, the decimal point may appear, as previously explained). The words on the cheque could appear as "two pounds and nine pence", though simply 'two pounds 09" is permissible. However, where a cheque is drawn for a sum below £1 the new pence should always be written in words as well as figures. Thus: "fifty-two pence", figures "£0-52".

									0.	u		2		LLI	(J)						
70	LO	0	LC)	700	20	0000	35	40	45	200	22	09	65	102	12	000	20	06	(S)	00	
200	4	S	7	5	24	29	34	300	44	49	24	20	64	69	74	62	84	600	3	50	S
5	4	o	4	5	24	500	34	30	44	49	54	59	64	69	74	13	84	600	26	66	LLI
70	3	00	3	00	23	28	333	38	43	48	23	28	63	89	73	28	83	88	8	86	2
70	(m)	00	2	00	23	782	333	38	43	48	53	28	63	68	73	28	83	88	86	80	2
700	(7)		2		23	L2	(m)	37	43	47	53	27	63	67	13	11	833	87	603	5	
200	N		N		22	27	1 CS	37	42	47	52	57	62	67	72	11	82	87	26	26	
49	N		2		22	27	32	37	42	47	52	27	62	67	72	77	82	87	92	20	
39	~~~	9	~	0	7	76	31	36	41	46	21	26	61	99	7.1	19/	8	86	01	96	S
20.7		9	4	9	7	76	31	36	41	46	21	26	6.1	99	71	16	8	86	01	96	2
7	0	LO	0	5	20	25	30	35	40	45	20	55	09	65	10/	15/	80	85	06	95	
8		LO	0	12	20	25	30	35	40	45	20	52	9	65	70	75	80	85	06	05	
Currency			7/7	1/8	4/1	2/1	9	1/2	-/8	1/6	10/-		12/-	13/-	14/-	18/1	16/-	11/1	18/-	1/6	

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Currency Currency			7/7	3/-	4/-	2/1	1/9		1/8	1/6	10/-		12/-	13/-	14/1	1/2/-	1.6/-	11/21	18/1	100	